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EXAMINER

WHIPPLE, BRIAN P

ART UNIT	PAPER NUMBER
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2152

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/627,324	Applicant(s) ANDRZEJAK ET AL.	
	Examiner Brian P. Whipple	Art Unit 2152	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17, 20-37 and 40 is/are rejected.
- 7) ☒ Claim(s) 18, 19, 38 and 39 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>07/25/2003</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-40 are pending in this application and presented for examination.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 31-32 are rejected for lack of antecedent basis. The claims refer to "[t]he computer readable memory of claim 9," but claim 9 is a method claim.

For the purposes of examination, the claims will be read as "The computer readable memory of claim 29."

Appropriate correction is required.

4. The following is a quotation of the fourth paragraph of 35 U.S.C. 112:

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

5. Claims 3 and 23 are rejected for failing to provide a further limitation. Specifically, "solving the integer program employs a local search solution" adds no further limitation when compared to "employing a local search solution to solve the integer program" in the parent claims 2 and 22.

Claim Rejections - 35 USC § 103

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6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sitbon et al. (Sitbon), U.S. Patent No. 5,993,038, in view of Lauck et al. (Lauck), U.S. Patent No. 5,734,825.

8. As to claim 1, Sitbon discloses a method of determining a placement of services of a distributed application onto nodes of a distributed resource infrastructure (Abstract, ln. 9-14) comprising the steps of:

forming an objective (Col. 3, ln. 66 – Col. 4, ln. 4); and

employing a local search solution to solve an integer program comprising the communication constraints and the objective, which determines the placement of the services onto the nodes (Col. 3, ln. 66 – Col. 4, ln. 4).

Sitbon is silent on forming communication constraints between node pairs which ensure that a sum of transport demands between a particular node pair does not exceed a transport capacity between the particular node pair, each term of the sum comprising a product of a first placement variable, a second placement variable, and the transport demand between the services associated with the first and second placement variables.

However, Lauck discloses forming communication constraints between node pairs which ensure that a sum of transport demands between a particular node pair does not exceed a transport capacity between the particular node pair, each term of the sum comprising a product of a first placement variable, a second placement variable, and the transport demand between the services associated with the first and second placement variables (Col. 3, ln. 66 – Col. 4, ln. 14; Col. 5, ln. 26-38; a virtual circuit establishes communication between a source end station and a destination end station, which is a node pair; a virtual circuit is put in place between a first node, a first placement variable, and a second node, a second placement variable; the sum of all transmission rates of all virtual circuits passing through a link are calculated to ensure they do not exceed link capacity).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Sitbon by ensuring that communications between nodes do not exceed transmission capacity as taught by Lauck in order to avoid overloading a line for the purposes of avoiding packet loss.

9. As to claim 21, the claim is rejected for the same reasons as claim 1 above.

10. Claims 2-6, 13-17, 22-26, and 33-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sitbon, in view of Lauck, further in view of Leymann et al. (Leymann), U.S. Patent No. 6,507,844 B1.

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11. As to claim 2, Sitbon discloses a method of determining a placement of services of a distributed application onto nodes of a distributed resource infrastructure (Abstract, ln. 9-14) comprising the steps of:

establishing an application model of the services comprising transport demands between the services (Abstract, ln. 9-14);

forming an integer program that comprises: an objective (Col. 3, ln. 66 – Col. 4, ln. 4); and

employing a local search solution to solve the integer program which determines the placement of the services onto the nodes (Col. 3, ln. 66 – Col. 4, ln. 4).

Sitbon is silent on establishing an infrastructure model of the nodes comprising transport capacities between the nodes;

forming an integer program that comprises: a set of placement variables for a combination of the services and the nodes, each of the placement variables indicating whether a particular service is located on a particular node; and

communication constraints between node pairs which ensure that a sum of the transport demands between a particular node pair does not exceed the transport capacity between the particular node pair, each term of the sum comprising a product of a first placement variable, a second placement variable, and the transport demand between the services associated with the first and second placement variables.

However, Lauck discloses establishing an infrastructure model of the nodes comprising transport capacities between the nodes (Col. 3, ln. 66 – Col. 4, ln. 14);

communication constraints between node pairs which ensure that a sum of the transport demands between a particular node pair does not exceed the transport capacity between the particular node pair, each term of the sum comprising a product of a first placement variable, a second placement variable, and the transport demand between the services associated with the first and second placement variables (Col. 3, ln. 66 – Col. 4, ln. 14; Col. 5, ln. 26-38).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Sitbon by ensuring that communications between nodes do not exceed transmission capacity as taught by Lauck in order to avoid overloading a line for the purposes of avoiding packet loss.

Sitbon and Lauck do not disclose forming an integer program that comprises: a set of placement variables for a combination of the services and the nodes, each of the placement variables indicating whether a particular service is located on a particular node.

However, Leymann does disclose forming an integer program that comprises: a set of placement variables for a combination of the services and the nodes, each of the placement variables indicating whether a particular service is located on a particular node (Col. 4, ln. 53-65).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Sitbon and Lauck by keeping a set of placement variables for a combination of services and nodes as taught by Leymann in order to track the placement of services for the purposes of communicating the location of

services to nodes and doing so in a way that minimizes network traffic (Leymann, Col. 4, ln. 53-65).

12. As to claim 3, the claim is rejected for the same reasons as claim 2 above.

13. As to claim 4, Sitbon, Lauck, and Leymann disclose the invention substantially as in parent claim 2, including the objective comprises minimizing communication traffic between the nodes (Leymann, Col. 4, ln. 53-65).

14. As to claim 5, Sitbon, Lauck, and Leymann disclose the invention substantially as in parent claim 2, including the application model further comprises processing demands for the services (Sitbon, Abstract, ln. 9-14).

15. As to claim 6, Sitbon, Lauck, and Leymann disclose the invention substantially as in parent claim 5, including the infrastructure model further comprises processing capacities for the nodes (Sitbon, Abstract, ln. 9-14; Col. 4, ln. 66-67).

16. As to claim 13, Sitbon, Lauck, and Leymann disclose the invention substantially as in parent claim 2, including the application model further comprises storage demands for the services (Sitbon, Abstract, ln. 9-14; Col. 3, ln. 66 – Col. 4, ln. 4; Col. 5, ln. 1-3).

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17. As to claims 14-15, the claims are rejected for the same reasons as claim 13 above.

18. As to claim 16, Sitbon, Lauck, and Leymann disclose the invention substantially as in parent claim 2, including the integer program further comprises placement constraints which ensure that each of the services is placed on one and only one of the nodes (Sitbon, Abstract, In. 9-14; only the node with the lightest load is selected).

19. As to claim 17, Sitbon, Lauck, and Leymann disclose the invention as in parent claim 2, including the services reside on the nodes according to a previous assignment (Sitbon, Abstract, In. 9-14; the service is executed on a selected machine, which is a service residing on a node according to a previous assignment).

20. As to claim 22, the claim is rejected for the same reasons as claim 2 above.

21. As to claim 23, the claim is rejected for the same reasons as claim 3 above.

22. As to claim 24, the claim is rejected for the same reasons as claim 4 above.

23. As to claim 25, the claim is rejected for the same reasons as claim 5 above.

24. As to claim 26, the claim is rejected for the same reasons as claim 6 above.

25. As to claim 33, the claim is rejected for the same reasons as claim 13 above.
26. As to claim 34, the claim is rejected for the same reasons as claim 14 above.
27. As to claim 35, the claim is rejected for the same reasons as claim 15 above.
28. As to claim 36, the claim is rejected for the same reasons as claim 16 above.
29. As to claim 37, the claim is rejected for the same reasons as claim 17 above.
30. Claims 7-11, 20, 27-31, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sitbon, Lauck, and Leymann as applied to claims 6 and 26 above, and further in view of Smith, U.S. Patent No. 5,878,224.
31. As to claim 7, Sitbon, Lauck, and Leymann disclose the invention substantially as in parent claim 6, but are silent on the integer program further comprises processing constraints which ensure that a sum of the processing demands for each of the nodes does not exceed the processing capacity for the node.

However, Smith discloses the integer program further comprises processing constraints which ensure that a sum of the processing demands for each of the nodes does not exceed the processing capacity for the node (Abstract; Col. 11, ln. 18-29).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Sitbon, Lauck, and Leymann by ensuring that a sum of processing demands do not exceed a processing capacity of a node as taught by Smith in order to avoid pushing the total load of a server beyond what it can handle (Smith, Col. 11, ln. 18-29) for the purposes of avoiding errors and packet loss.

32. As to claim 8, Sitbon, Lauck, Leymann, and Smith disclose the invention substantially as in parent claim 7, including the objective comprises minimizing communication traffic between the nodes (Leymann, Col. 4, ln. 53-65) and balancing the processing demands of the nodes (Sitbon, Abstract, ln. 9 –14; Col. 4, ln. 66-67).

33. As to claim 9, Sitbon, Lauck, and Leymann disclose the invention substantially as in parent claim 6, but are silent on the processing demands and the processing capacities are normalized according to a processing criterion.

However, Smith discloses the processing demands and the processing capacities are normalized according to a processing criterion (Abstract; Col. 11, ln. 18-29).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Sitbon, Lauck, and Leymann by normalizing the processing demands and processing capacities of a node as taught by Smith in order to avoid pushing the total load of a server beyond what it can handle (Smith, Col. 11, ln. 18-29) for the purposes of avoiding errors and packet loss.

34. As to claim 10, Sitbon, Lauck, Leymann, and Smith disclose the invention substantially as in parent claim 9, including the processing criterion comprises an algorithm speed (Smith, Col. 8, ln. 63 – Col. 9, ln. 10).

35. As to claim 11, Sitbon, Lauck, Leymann, and Smith disclose the invention substantially as in parent claim 9, including the processing criterion comprises a transaction speed (Smith, Col. 9, ln. 48 – Col. 10, ln. 7; Col. 10, ln. 33-40).

36. As to claim 31, the claim is rejected for the same reasons as claim 11 above.

37. As to claims 20 and 40, the claims are rejected for the same reasons as 2, 5-8, and 13-16 above.

38. As to claim 27, the claim is rejected for the same reasons as claim 7 above.

39. As to claim 28, the claim is rejected for the same reasons as claim 8 above.

40. As to claim 29, the claim is rejected for the same reasons as claim 9 above.

41. As to claim 30, the claim is rejected for the same reasons as claim 10 above.

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42. Claims 12 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sitbon, Lauck, Leymann, and Smith as applied to claims 9 and 29 above, and further in view of Ben Nun et al. (Ben Nun), U.S. Patent No. 6,928,482 B1.

43. As to claim 12, Sitbon, Lauck, Leymann, and Smith disclose the invention substantially as in parent claim 9, including finding processing capacities of nodes (Sitbon, Abstract, ln. 9-14; Col. 4, ln. 66-67) and different types of nodes being normalized according to the processing criterion (Smith, Abstract; Col. 11, ln. 18-29), but are silent on finding the processing capacities of the nodes according to a look-up table.

However, Ben Nun discloses finding processing capacities of nodes according to a look-up table (Abstract; Fig. 5; Col. 15, ln. 23-41).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Sitbon, Lauck, Leymann, and Smith by finding the processing capacities of the nodes by using a look-up table as taught by Ben Nun in order to determine and store a mapping logic in a standard form of storage.

44. As to claim 32, the claim is rejected for the same reasons as claim 12 above.

Allowable Subject Matter

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45. Claims 18-19 and 38-39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

46. The following is a statement of reasons for the indication of allowable subject matter: prior art disclosing a step of assessing reassignment penalties for service placements that differs from the previous assignment could not be found.

Additionally, this would appear to run counter to the prior art cited as they primarily deal with dynamic reassignment for purposes such as load balancing and faults. Penalizing reassignment would seem to run counter to the objectives of these prior arts.

Conclusion

47. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kawano et al., U.S. Patent No. 5,511,167 discloses a program processing method and apparatus for producing a data flow type program.

Aditya, U.S. Patent No. 5,918,021 discloses a system and method for dynamic distribution of data packets through multiple channels.

Mairs et al., U.S. Patent No. 6,032,188 discloses a method and system for controlling data flow.

Badovinatz et al., U.S. Patent No. 6,052,712 discloses a barrier synchronization system in a distributed computing environment.

Yoshimura et al., U.S. Patent No. 6,125,397 discloses a data transfer apparatus and method using congestion recovery-type and congestion avoidance-type data transfers.

Cohen et al., U.S. Patent No. 6,125,400 discloses a method and system for running object-oriented programs across a network through compression and distillation of remote method invocation.

Ramakrishnan, U.S. Patent No. 6,167,029 discloses a system and method for integrated data flow control.

Borowsky et al., U.S. Patent No. 6,366,931 B1 discloses an apparatus for and method of non-linear constraint optimization in storage system configuration.

Basel, U.S. Patent No. 6,473,801 B1 discloses a system and method for arbitrating bandwidth on segmented network topologies.

Nguyen et al., U.S. Publication No. 2003/0005132 A1 discloses distributed service creation and distribution.

Fletcher et al., U.S. Publication No. 2003/0055868 A1 discloses building distributed software services as aggregations of other services.

Kouznetsov et al., U.S. Patent No. 6,782,527 B1 discloses a system and method for efficient distribution of application services to a plurality of computing appliances organized as subnets.

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Munger et al., U.S. Patent No. 6,834,310 B2 discloses preventing packet flooding of a computer on a computer network.

Charny et al., U.S. Patent No. 6,978,394 B1 discloses a linear program-based technique for placing tunnels with bandwidth guarantee.

Chetuparambil et al., U.S. Patent No. 7,089,299 B2 discloses distributed application deployment using program characteristics and environment characteristics.

48. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Whipple whose telephone number is (571) 270-1244. The examiner can normally be reached on Mon-Fri (8:30 AM to 5:00 PM EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bunjob Jaroenchonwanit can be reached on (571) 272-3913. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BPW

Brian P. Whipple
3/21/07



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